THE ASTEROID FAUNA (ECHINODERMATA) OF MARION AND PRINCE EDWARD ISLANDS

by

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(With 2 figures and 1 table)

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ABSTRACT

Thirty-one species of asteroids were collected in waters off Marion and Prince Edward (MPE) islands during benthic surveys made by the University of Cape Town between 1982 and 1989. From the thirty-one species, one is new to science (*Solaster dianei* sp. nov.), eleven are new for the MPE area and eight were previously known only from the Subantarctic part of the Weddell quadrant.

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INTRODUCTION

The asteroid material on which the present report is based was collected between 5 m and 644 m depth near Marion and Prince Edward Islands (approximately 47°S, 37°E) during repeated benthic surveys carried out in 1982–9 by the University of Cape Town (UCT), South Africa.

The asteroid fauna of Marion and Prince Edward Islands (MPE) is poorly known. Twenty species are known to occur in the area mostly as a result of various scientific expeditions such as the Challenger Expedition (Sladen 1889), the Discovery Expedition (Fisher 1940; see also A.M. Clark 1962 [*Henricia fisheri*]), and the MPE South African Expeditions in 1965–6 and 1972–3 (Bernasconi 1968, 1971; Rowe and Clark 1975; respectively). Additional comments on some Marion asteroids species were also made by Jangoux (1982) and O'Loughlin & O'Hara (1990) (*Tremaster mirabilis* and *Smilasterias scalprifera*, respectively). The 1982–9 UCT benthic surveys collected thirty-one different species of asteroids, of which one is new to science and eleven are new for the MPE area. All the species known from previous expeditions were collected again but one, the korethrasterid *Peribolaster folliculatus* (taken by the Discovery).

Of the eleven species new for the MPE area, one was already known from the Enderby quadrant in the Subantarctic (viz. *Labidiaster annulatus*, a species that commonly occurs in Antarctic seas) and two were previously reported from Antarctic seas (*Solaster regularis* and *Odontaster validus*). The remaining nine species have a Subantarctic distribution and were previously recorded either both in the Weddell and Victoria quadrants (*Henricia obesa*) or in the Weddell quadrant only (*Odontaster penicillatus*, *Ceramaster patagonicus*, *Hippasteria falklandica*, *Hippasteria hyadesi*, *Pseudarchaster discus*, *Henricia studeri* and *Anteliaster australis*).

LIST OF STATIONS (all species were collected by dredging)

Station number	Date	Locality		Depth	Comments
		Lat. S.	Long. E.		
MAD 1	29/08/84	46°53'04"	37°53'05"	90	Very muddy substrate, black muddy volcanic sand covered in bryozoan fragments.
MAD 2	29/08/84	46°39'15"	37°52'02"	105–145	Rocky, shelly and bryozoan beds.
MAD 6	01/09/84	46°48'00"	38°00'00"	50–55	Very rocky bottom.
MAD 8	02/09/84	46°42'06"	37°48'05"	250–260	
MAD 12	16/04/85	46°45'00"	37°55'00"	150–152	
MAD 13	17/04/85	46°59'00"	37°47'05"	100–180	Muddy bottom.
MAD 15	21/04/85	46°35'00"	37°56'00"	48–50	
MAD 16	23/04/85	46°51'00"	38°04'00"	160–170	Sandy bottom dominated by polychaetes.

MAD 17	24/04/85	46°41'20"	37°49'00"	335–375	Very rocky bottom.
MAD 18	25/04/85	46°43'05"	38°01'00"	224–232	
MAD 20	26/04/85	46°49'00"	37°41'05"	34–42	Rocky and algae bottom.
MAD 21	29/04/85	47°01'02"	37°56'04"	349–351	Rocky bottom.
MAD 25	20/04/87	46°49'92"	37°53'95"	138–140	Fairly muddy bottom (lighter soil).
MAD 27	26/04/87	46°46'90"	38°00'00"	92–133	Light sandy bottom with volcanic rock.
MAD 28	28/04/87	46°43'58"	37°55'98"	237–243	Dark sediment.
MAD 29	28/04/87	46°41'25"	37°56'92"	143–147	Very muddy bottom covered in bryozoans.
MAD 31	04/05/87	46°53'92"	37°54'82"	42–85	Little sediment, red algae bottom.
MAD 32	07/05/87	46°49'35"	37°58'98"	147	Muddy bottom covered in bryozoan fragments.
MAD 37	24/08/87	46°40'55"	37°50'98"	460–488	Rocky bottom (large rocks).
MAD 38	25/08/87	46°57'88"	37°58'82"	190–210	Muddy bottom covered in bryozoan fragments.
MAD 39	26/08/87	46°59'75"	38°00'65"	360–376	Very rocky bottom.
MAD 40	31/08/87	46°40'25"	37°50'98"	375–462	Mixture of small pebbles and coarse gravel; little true sediment and no sand.
MAD 42	01/09/88	46°40'32"	37°51'00"	460–560	Rocky bottom, no sediment.
MAD 43	02/09/88	46°40'22"	37°51'20"	350–600	Rocky slope: large volcanic rocks, no sediment.
MAD 44	03/09/88	46°40'58"	37°50'20"	410–644	Rocky bottom, no sediment (slope area).
MAD 47	08/09/88	46°58'21"	37°52'00"	52–53	Muddy bottom (fine sediment).
MAD 48	05/09/88	46°58'68"	37°52'05"	92–105	Muddy bottom covered in bryozoan fragments.
MAD 49	07/09/88	47°00'35"	37°53'90"	265–306	Mud and rock substratum.
MAD 52	22/04/89	46°54'95"	37°34'15"	340–400	Very rocky bottom little sediment.
MAD 54	23/04/89	46°54'92"	37°35'00"	70–135	Coarse sediment with tiny volcanic rocks.
MAD 55	23/04/89	46°55'08"	37°35'20"	42–47	Very rocky; medium size pebbles and coarse gravel.
MAR 16	1982	46°51'03"	37°51'00"	10	Inshore collection at Transvaal Cove.
TP 5–8	1988	46°53'04"	37°52'03"	10	Diving survey at Trypot Point.
TVL 1–4	1988	46°51'03"	37°51'00"	5	Diving survey at Transvaal Cove.
TVL 5–8	1988	46°51'03"	37°51'00"	10	Diving survey at Transvaal Cove.
BB 1–4	1988	46°54'06"	37°54'04"	5	Diving survey at Bullards Bay.
BB 5–8	1988	46°54'06"	37°54'04"	10	Diving survey at Bullards Bay.

LIST OF COLLECTED SPECIES

The number of specimens and, when relevant, their measurements are indicated between brackets. Species new for the area are indicated in bold; an * means that the species is discussed below. R = length of the longest arm (radius); r = length from disc centre to interradius.

Families and species	Stations and numbers of individuals
ASTROPECTINIDAE	
Bathybiaster loripes Sladen, 1889	MAD 18 (2 juvenile)
Leptychaster kerguelenensis Smith, 1876	MAD 8 (1 juvenile); MAD 39 (1 juvenile)
ODONTASTERIDAE	
Acodontaster elongatus (Sladen, 1889)	MAD 12 (1 juvenile)
Odontaster meridionalis (Smith, 1876)	MAD 27 (1 juvenile); MAD 31 (2 : R/r mm = 21/10 & 47/18)
Odontaster penicillatus (Philippi, 1870)	MAD 44 (2 : R/r= 16/8 & 20/10 mm); MAD 31 (3 juvenile)
Odontaster validus Koehler, 1905	MAD 25 (3 : R/r mm [range] = 19–21/8:–12); MAD 43 (1: juvenile); MAD 37 (1 juvenile)
GONIASTERMAE	
****Ceramaster patagonicus*** (Sladen, 1889)	MAD 44 (1)
****Hippasteria falklandica*** Fisher, 1940	MAD 44 (1 : R/r mm = 73/27)
****Hippasteria hyadesi*** Perrier, 1891	MAD 42 (2 : R/r mm = 37/15 & 41/19)
****Pseudarchaster discus*** Sladen, 1889	MAD 39 (2 : R/r mm = 20/6 & 24/9)
ASTERINIDAE	
Tremaster mirabilis Verrill, 1879	MAD 44 (1 : R/r mm = 80/67 mm)
PORANIIDAE	
Porania antarctica Smith, 1876	MAD 1 (1 juvenile); MAD 29 (2 : R/r mm = 34/13 & 39/18); MAD 48 (3 : R/r mm [range] = 58–60/21–25)
ECHINASTERIDAE	
**Henricia fisheri* A.M. Clark, 1962	MAD 28 (1 : R/r mm = 44/7); MAD 44 (2 : R/r mm = 31/4 & 31/4) MAD 55 (1 : R/r mm = 34/6)
****Henricia*** sp. aff. ***H. obesa*** (Sladen, 1889)	MAD 44 (2: R/r mm = 37/8 & 48/10)
Henricia praetans (Sladen, 1889)	MAD 12 (1 juvenile); MAD 15 (7: R/r mm [range] = 10–15/3–5); TVL 1–4 (1: R/r mm= 12/3)

ECHINASTERIDAE *continued*	
**Henricia* sp. aff. *simplex* (Sladen, 1889)	MAD 1 (1 juvenile); MAD 6 (3 juvenile); MAD 38 (1 : R/r mm = 20/3)
****Henricia*** sp. aff. ***H. studeri*** (Perrier, 1891)	MAD 44 (1 : R/r mm = 36/6)
SOLASTERIDAE	
Crossaster penicillatus Sladen, 1889	MAD 16 (1 : R/r mm = 39/4); MAD 49 (1 : R/r mm = 37/4); MAD 28 (1 : R/r mm = 43/11); MAD 52 (1 juvenile)
Lophaster stellans Sladen, 1889	MAD 13(2 : R/r mm = 14/3 & 21/6)
****Solaster dianei*** nov. sp.	MAD 17 (1 : R/r mm = 59/18); MAD 43 (1 : R/r mm = 56/18)
****Solaster regularis*** Sladen, 1889	MAD 2 (1 : R/r mm = 61/31); MAD 44 (1 : R/r mm = 89/24); MAD 48 (1 : R/r mm = 62/18); MAR 16 (3 : R/r mm [range] = 47–59/17–26); TP 5–8 (8 : R/r mm [range] = 32–54/13–16); TVL 5–8 (1 juvenile); BB 5–8 (2: R/r mm = 60/16 & 92/25)
PTERASTERIDAE	
Diplopteraster semireticulatus (Sladen, 1882)	MAD 21 (1 : R/r mm = 48/31)
Pteraster affinis Smith, 1876	MAD 8 (1 : R/r mm = 61/20)
LABIDIASTERIDAE	
Labidiaster annulatus Sladen, 1876	MAD 8 (1 juvenile); MAD 40 (1 juvenile); MAD 43 (1 juvenile)
ASTERIIDAE	
Anasterias rupicola (Verrill, 1876)	MAD 16 (1 : R/r mm = 29/9)
****Anteliaster australis*** Fisher, 1940	MAD 12 (2 : R/r mm = 19/4 & 19/4).
Anteliaster scaber (Smith, 1876)	MAD 21 (1 juvenile); TVL 5–8 (1 juvenile); BB 1–4 (1 juvenile)
Diplasterias meridionalis (Perrier, 1875)	MAD 31 (1: R/r mm = 40/8); MAD 47 (1 : R/r mm [range] = 41/9); MAD 54 (3: R/r mm [range] = 23–44/6–10)
Pedicellaster hypernotius Sladen, 1889	MAD 12 (1 : R/r mm = 15/4)
Smilasterias scalprifera (Sladen, 1889)	MAD 47 (4 : R/r mm [range] = 74–82/8–11)
Smilasterias triremis (Sladen, 1889)	MAD 15 (2 : R/r mm = 18/4 & 18/4); MAD 20 (2 : R/r mm = 14/3 & 17/4); MAD 47 (9 : R/r mm [range] = 24–25/4–6); MAR 16 (2 : R/r mm = 20/5 & 29/6); TVL 1–4 (1 : R/r mm = 25/6)

TAXONOMICAL AND ZOOGEOGRAPHICAL COMMENTS

Ceramaster patagonicus (Sladen, 1889)

?*Astrogonium granulare* Whiteaves, 1887: 117 (according to Fisher 1911).

Pentagonaster patagonicus Sladen, 1889: 269, pl. 46 (figs 3–4); pl. 49 (figs 3–4).

Mediaster patagonicus Verrill, 1899: 145, 4 figs.

Pentagonaster austrogranularis Perrier, 1891: 127, pl. 12 (figs 3a–3b) (synonymized by Fisher 1940).

Ceramaster patagonicus Fisher, 1911: 214–6, pl. 37 (fig. 4), pl. 38 (figs 1–2), pl. 60 (fig. 3); 1940: 118. Koehler, 1923: 94. Djakonov, 1950: 48, figs 21, 88, 186. A.M. Clark, 1962: 23. Bernasconi, 1963: 8, pl. 1 (figs 1–2), pl. 2 (fig. 3); 1973: 297, pl. 7 (fig. 2). Tommasi, 1970: 12 (fig. 36). Codoceo & Andrade, 1979: 156, pl. 2 (figs 5–6).

Ceramaster patagonicus var. *euryplax* H.L. Clark, 1923: 262–4, pl. 14 (figs 1–2); 1926: 9–10. A.M. Clark, 1952: 195, 204–5.

Ceramaster chondriscus H.L. Clark, 1923: 258–60, pl. 14 (figs 5–6). Mortensen, 1933: 242 (synonymized by A.M. Clark 1974).

Ceramaster patagonicus productus Djakonov, 1950: 48.

Ceramaster patagonicus euryplax A.M. Clark, 1974: 435. A.M. Clark & Courtman-Stock, 1976: 61.

Though *Ceramaster patagonicus* has been rather frequently recorded over the past 100 years, its status needs examination mostly because of its puzzling distribution. The type locality is station 313 of the Challenger Expedition (Atlantic entrance to the Strait of Magellan; Sladen 1889). In the southern hemisphere, the species was found around the southernmost part of South America (New Year Sound, Cape Horn, Perrier 1891; Falkland plateau, Koehler 1923 and Fisher 1940; off South Argentina, Bernasconi 1963; off South Brazil, Tommasi 1976; off Central Chile, Codoceo & Andrade 1979) as well as off the Atlantic coast of South Africa (subspecies *euryplax*; see A.M. Clark & Courtman-Stock 1976). The species was also reported to occur in the N.E. Pacific (from the Gulf of California to south of the Alaskan Peninsula; Verrill 1899, Fisher 1911), in the southern portion of the Bering Sea (Djakonov 1950), and in the Okhotsk Sea (subspecies *productus*; Djakonov 1950).

Hippasteria falklandica Fisher, 1940

Hippasteria falklandica Fisher, 1940: 125, pl. 3 (fig. 2), pl. 4 (fig. 4). A.M. Clark, 1962: 22. Bernasconi, 1963: 15–6; 1973: 299–300, pl. 4 (figs 1, 4).

This is the third record of a species known only from two specimens, viz. the type specimen (type locality: Falkland Islands, 225–51 m; Fisher 1940) and an additional one originating from off Buenos Aires province, Argentina (Bernasconi 1973). The discovery of the species in the MPE area greatly extends its geographical distribution.

Although smaller than the holotype (R/r mm = 129/43 & 73/27 for the holotype and the MPE specimen respectively), the MPE specimen fits Fisher's original description rather well. The limits of abactinal plates are difficult to distinguish as they are not outlined by a row of closely appressed peripheral granules as in many other *Hippasteria* species. Abactinal plates with small scattered granules and with a well-developed bivalve pedicellaria (from 1.5 to 3.5 mm long) or one (mostly) or two globose tubercles.

Superomarginals are clearly marked off from the abactinals while inferomarginals are not easily distinct from the outer actinolaterals. Most marginal plates carry one or two bivalve pedicellariae and one to three globose tubercles. The terminal superomarginals gradually decrease in size instead of being larger than the subterminal plates as they are in the holotype. Most actinolateral plates bear a long bivalve pedicellaria; this is surrounded by enlarged squarish to polygonal granules. Adambulacral plates usually have two furrow spines (some proximal-most plates having only one) and two stouter subambulacral spines arranged transversally; these are surrounded by small, flattened, peripheral granules.

Hippasteria hyadesi Perrier, 1891

Hippasteria hyadesi Perrier, 1891: 128. Fisher, 1940: 125–6. A.M. Clark, 1962: 22. Bernasconi, 1963: 16–17, pl. 3 (fig. 2), pl. 5 (fig. 2). Codoceo & Andrade, 1979: 156, pl. 2 (figs 3–4).

The species was previously known from the type locality (Puerto Hambre, Magellan Strait, 36 m, 1 specimen; Perrier 1891) and from off central Chile (300–400 m, 6 specimens; Codoceo & Andrade 1979). Its discovery in the MPE area significantly extends its known geographical distribution.

The MPE specimens (R/r mm = 37/15 & 41/19) are slightly smaller than the holotype (R/r of the holotype: 50/9 mm; Bernasconi 1963) and much smaller than the largest recorded specimen whose R/r ratio is 144/62 mm (Codoceo & Andrade 1979). Abactinal plates are outlined by a distinct row of spaced peripheral granules. Both carinal and proximal-most adcarinal plates are enlarged and circular in shape; each plate bears a stout conical spine. Other abactinal plates are quadrangular to pentagonal in shape. They bear either one (sometimes two) globose tubercules or a well developed bivalve pedicellaria. Small secondary triangular abactinal plates occur in the disc centre between some of the most proximal carinal and adcarinal plates. Superomarginals and inferomarginals are clearly distinct from the abactinal and actinolateral plates. Marginals, outlined by closely appressed granules, bear from one to three stout conical spines (neither bivalve pedicellariae nor globose granule occur on these plates). Actinolateral plates are outlined by small flattened granules; the actinolaterals lining the adambulacral plates usually have one bivalve pedicellaria while others bear one or two globose to squarish tubercles. Adambulacral plates with usually one (two on the most proximal) elongated furrow spines and one shorter conical subambulacral spine.

Pseudarchaster discus Sladen, 1889

Pseudarchaster discus Sladen, 1889: 110, pl. 19 (figs 1–2), pl. 42 (figs 3–4). Fisher, 1940: 117. A.M. Clark, 1962: 23. Bernasconi, 1963: 5–7, pl. 2 (figs 1–2), pl. 4 (fig. 2). Codoceo & Andrade, 1979: 157, pl. 3 (figs 1–2).
Astrogonium patagonicum Perrier, 1891: 125, pl. 13 (figs 2a–b) (synonymized by Fisher 1940).

That species was already known from various samples collected in the Magellan and Falkland areas as well as off Argentina (Rio de la Plata) and off central Chile. It is now reported from the Subantarctic part of the Enderby quadrant. Although these are smaller than most specimens previously sampled (R of the holotype = 30 mm), the MPE specimens agree well with Sladen's (1889) original description; the present specimens have well marked postadambulacral fascioles.

Genus *Henricia* Gray, 1840

In his report on the asteroids collected by the Discovery Expedition, Fisher (1940, p. 162) wrote that 'the name *Henricia* is applied to a considerable number of extremely unstable entities, for convenience called species'; the situation today remains almost unchanged. Twelve Antarctic and Subantarctic species of *Henricia* have been described based, in most cases, on vague or poorly established criteria. As, moreover, *Henricia* species show high intraspecific variability (e.g. Madsen 1987) identifications are rather uncertain, the geographical origins of the specimens being sometimes the only objective parameter that can be used (see A.M. Clark 1962). There is an obvious need for a careful revision of the southern species of *Henricia.*

Henricia fisheri A.M. Clark, 1962

Henricia simplex (pars) Sladen, 1889: 547–8 (only station 148).
Henricia simplex Fisher, 1940: 168–169, pl. 11 (fig. 3).
Henricia fisheri A.M. Clark, 1962: 46, text-fig. 5i, pl. 2 (figs 3, 6).

Henricia fisheri is one of the few well-defined southern species of *Henricia.* It has been described by A.M. Clark (1962) from Crozet and Marion specimens previously identified as *Henricia simplex* by Sladen (1889) and Fisher (1940), respectively. The individuals have a rather small-meshed abactinal skeleton, most meshes containing three to four papulae. Abactinal spinelets are single, well separate from each other, and sheathed in skin. As reported by A.M. Clark (1962), the actinal and inferomarginal plates are very regularly arranged in longitudinal series (no actinal papulae were observed on the MPE specimens). Adambulacral plates bear three to five subambulacral spinelets arranged in a single transverse series.

Henricia sp. aff. *Henricia obesa* (Sladen, 1889)

Cribrella obesa Sladen, 1889: 544–5, pl. 96 (figs 3–4), pl. 98 (figs 5–6).
Cribrella hyadesi Perrier, 1891: 100–102, pl. 9 (figs 1a–d), pl. 10 (fig. 2).
Henricia hyadesi H.L. Clark, 1910: 336, pl. 2 (fig. 5).
Henricia hyadesi H.L. Clark, 1916: 60; 1946: 148.
Henricia pagenstecheri (pars) Koehler, 1923: 60 (according to Fisher 1940).
Henricia obesa Fisher, 1940: 164–6, pl. 11 (fig. 2). Mortensen, 1941: 3, pl. 1 (fig. 3). Madsen, 1956: 30; 1965: 169. A.M. Clark, 1962: 48–9, text-figs 5n–6a–c. Bernasconi, 1966: 169; 1973: 308; 1980: 250, pl. 1 (figs 3–4). Hernandez & Tablado, 1985: 4–5, fig. 1a–b. Rowe & Albertson, 1987: 190–2, fig 2a–b.

The species is known mostly from the Subantarctic part of the Weddell quadrant. It is also reported off Macquarie Island and off South Australia (Rowe & Albertson 1987). The MPE specimens have a rather large-meshed abactinal skeleton, with one to four papulae per mesh. Inferomarginal plates with ten to twelve spinelets. Actinolateral plates with two to six spinelets: four to six spinelets on the most proximal plates; two spinelets on the most distal ones. Only the innermost actinolateral series reaches the arm tips. Papulae widespread actinolaterally. Adambulacral armature made of six to seven spinelets arranged in bifid ('Y') series.

Henricia sp. aff. *Henricia simplex* (Sladen, 1889)

Cribrella simplex Sladen, 1889: 547, pl. 97 (figs 5–6), pl. 98 (figs 9–10).
Henricia simplex Mortensen, 1941: 2. A.M. Clark, 1962: 37.

As papulae occur between the proximal actinolateral plates, the MPE specimens belong to the *pagenstecheri* group. The last includes three species—viz. *Henricia pagenstecheri* (Studer, 1885), *Henricia simplex* (Sladen, 1889), and *Henricia lukinsi* (Farquhar, 1898)—that are almost indistinguishable from each other except in considering their type localities (see A.M. Clark 1962). Because of their relatively small-meshed abactinal skeleton, the MPE specimens are tentatively identified *Henricia simplex,* a species already recorded in MPE waters (Sladen 1889).

Henricia sp. aff. *Henricia studeri* (Perrier, 1891)

Cribrella studeri Perrier, 1891: 102, pl. 9 (fig. 2).
Henricia studeri Fisher, 1940: 163, pl. 11 (fig. l). A.M. Clark, 1962: 38. Bernasconi, 1966: 169; 1980: 252–3, pl. 1 (figs 1–2). Codoceo & Andrade, 1979: 158, pl. 4 (figs 5–6).

The MPE specimen presumably belongs to *Henricia studeri,* a species recorded several times in the Magellan–Falkland area. Abactinal spinelets occur in clusters of ten to twelve spinelets that each have a multifid vitreous tip. Actinal and inferomarginal plates

are linked by bar-like plates giving the actinal skeleton a regular transverse arrangement. Actinolateral plates with *c.* ten spinelets each, arranged in two rows. Papulae occur all over the actinal surface. Proximal adambulacral plates with two transverse series of spinelets with four to five spinelets in each series.

Solaster dianei sp. nov
Figs 1, 2

Material

SAM–A24025, between Marion and Prince Edward Islands (46°41'2" S–37°39'0" E), 335–375 m, 1 specimen (Holotype); SAM–A24009, off Prince Edward Island (46°40'2" S–37°51'2" E), 1 specimen (Paratype).

Etymology

Dedicated to Diane Gianakouras who oversaw the 1982–9 faunistic survey of the Marion and Prince Edward area.

Diagnosis

A species of *Solaster* with 7 triangular-shaped arms. Abactinal paxillae short, irregularly arranged except at the sides of arms where they form oblique transverse series. Superomarginal paxillae clearly larger than the most lateral abactinal paxillae. Actinolateral area fairly large with 4 rows of actinolateral plates at the base of the arms. Actinal surface of oral plates covered with spinelets.

Description of the holotype

Arms 7; R = 59 mm; r = 18 mm; R = 3.3 r; breadth of arms at base 12 mm. Disk large; arms triangular, tapering progressively towards their distal extremity. Interbrachial arcs acute. Abactinal surface convex; actinal surface flat (Figs 1A, B).

Most abactinal plates 3 to 4-lobed. Abactinal paxillae 0.1 to 0.3 mm in diameter, and spaced 1 to 3 times their width (Fig. 2A). Largest disk paxillae with a crown up to 25 short point- to blunt-tipped spinelets measuring 0.15 mm in length; paxillae of the mid-central part of arms with up to 20 spinelets. Basal parts of spinelets form a single paxilla united in a membrane. Generally 2 papulae present in each skeletal mesh. Paxillae irregularly arranged except on arm sides where they form regular oblique transverse series. Abactinal paxillae occurring close to inferomarginals small; they bear *c.* 11 very short spinelets.

Superomarginal paxillae enlarged, easily distinguishable from the most lateral abactinal ones (Fig. 2B); those of the most proximal part of the arm measure 0.3 mm in diameter and have up to 30 spinelets (0.25 mm in length). Inferomarginal plates 42, conspicuous, defining the ambitus; proximal plate with an enlarged fan-like, transversally compressed pseudopaxilla measuring 2.5 mm in length and 0.3 mm in breadth. Inferomarginal fans with 3 to 4 transversal rows of spinelets measuring up to 1.5 mm in length.

Actinal interradial areas fairly large with four series of actinolateral plates, the

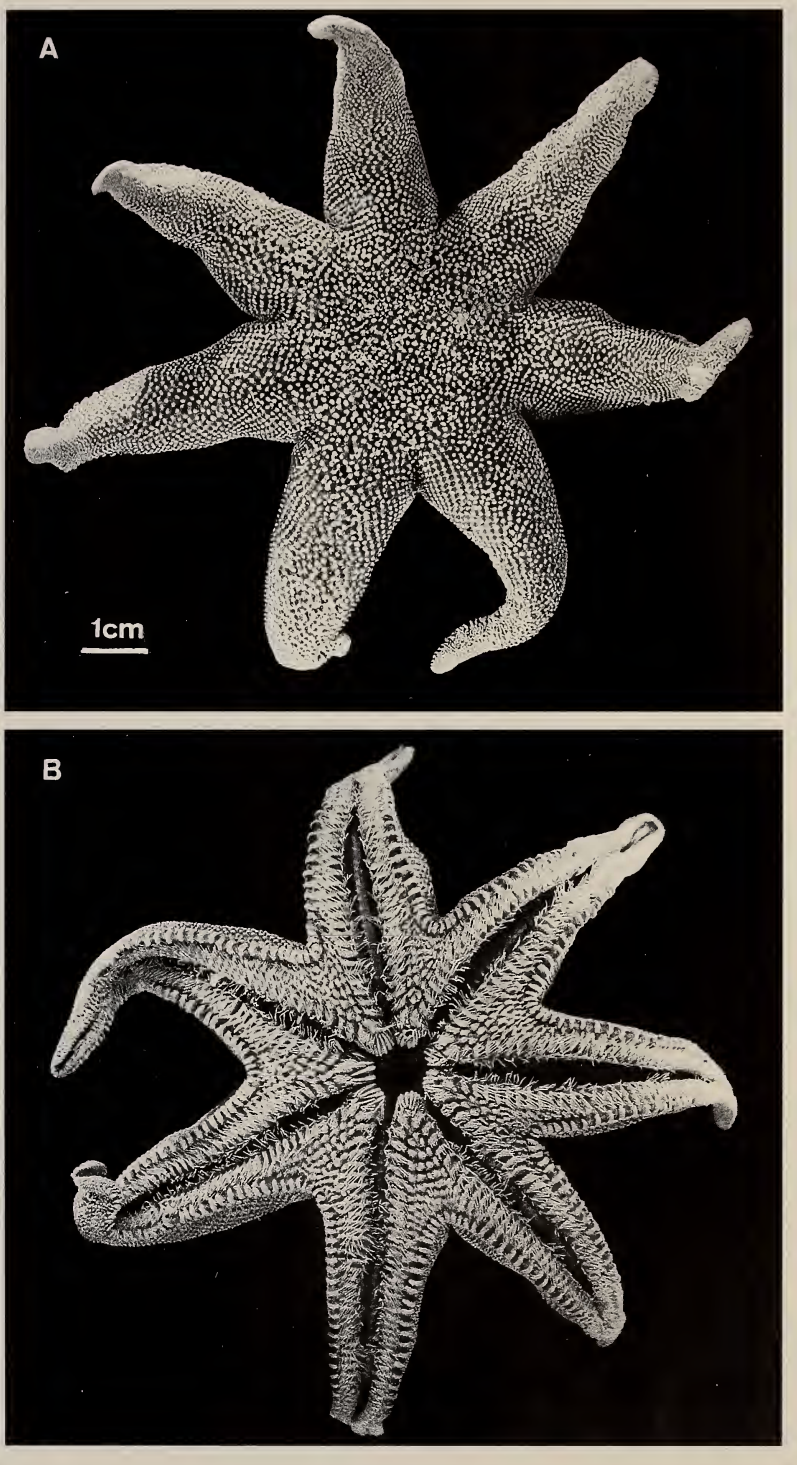

Figure 1
Solaster dianei nov. sp. Abactinal (A) and actinal (B) views of the holotype.

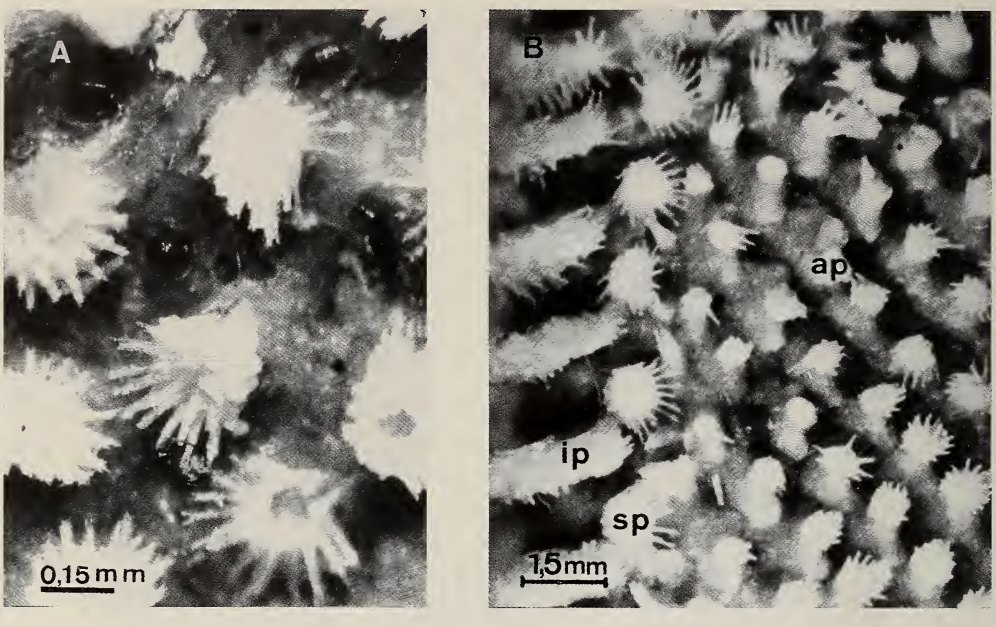

Figure 2
Solaster dianei nov. sp. (holotype). A. Abactinal paxillae of the disk central part. B. Profile view showing the abactinolateral (ap), superomarginal (sp) and inferomarginal (ip) paxillae.

innermost one extending half the arm length. Each actinolateral with a paxillar-like group of 4 to 8 spinelets up to 0.9 mm in length.

Adambulacral plates with 4 furrow spines webbed at their base, and 1 or 2 (most proximal plates) transverse combs of 6 to 7 subambulacral spines (*c.* 0.8 in length). Oral plates with 10 somewhat elongated furrow spines (maximal length: 1.5 mm), the surface of the plates being covered by up to 15 irregularly arranged shorter suboral spines.

Note on the paratype

R = 56 mm; r = 18 mm; R = 3.1 r. There are only slight differences between the two specimens, probably a result of size, viz. the paratype has 12 oral furrow spinelets (10 in the holotype) and up to 9 spinelets per subambulacral series (no more than 7 in the holotype).

Discussion

The species clearly belongs to the genus *Solaster*; it has a dense small-meshed abactinal skeleton and the abactinal paxillae on arm sides forms oblique transverse series. It basically differs from the southern species of *Solaster*—*S. torulatus* (Sladen, 1889) and *S. regularis* (Sladen, 1889)—in its extensive actinolateral areas, the occurrence of two distinct series of marginal plates, and the arrangement of the suboral spinelets on the oral plates.

Solaster regularis Sladen, 1889

Solaster regularis Sladen, 1889: 454, pl. 60 (fig. I), pl. 62 (figs 5–6). A.M. Clark, 1962: 50. Bernasconi, 1973: 309–10. Codoceo & Andrade, 1979: 157, pl. 3 (figs 5–6).

Solaster subarcuatus Sladen, 1889: 455–7, pl. 70 (fig. 2), pl. 72 (figs 7, 8). Doderlein, 1928: 296, pl. 12 (fig. 4).

Crossaster australis Perrier, 1891: 113, pl. 10 (figs la–ld) (synonymized by Fisher 1940).

Solaster octoradiatus Ludwig, 1903: 25–7, pl. 3 (figs 2l–2). Bell, 1908: 11; 1917: 4. Jangoux & Massin, 1986: 91 (synonymized Fisher 1940).

Solaster australis Ludwig, 1905: 63. Fisher, 1911: 323 (synonymized by Fisher 1940).

Solaster regularis regularis Fisher, 1940: 178–9.

Solaster regularis subarcuatus Fisher, 1940: 179–80. A.M. Clark 1962: 55, text-figs 7o–s. McKnight, 1976: 28. Jangoux & Massin, 1986: 91.

Crossaster canopus H.E.S. Clark, 1963: 55, pl. 10 (figs 1–2), pl. 11 (synonymized by McKnight 1976).

According to Fisher (1940) two subspecies of *Solaster regularis* occur in the Southern Ocean, viz. *S. regularis regularis* from the Cape Horn region and the Falkland Plateau and *S. regularis subarcuatus* that is said to be 'probably circumpolar'. The species, however, is known to be extremely variable (see e.g. Bernasconi 1973) and this is confirmed by the examination of the 18 specimens (size range: from 32 to 92 mm arm length) collected during the MPE Survey (Table 1). Indeed, though some specimens resemble either the *regularis* or *subarcuatus* subspecies, most show mixed features suggesting that Fisher's subspecies might be artificial and may express the high polymorphism of the species.

Anteliaster australis Fisher, 1940

Anteliaster australis Fisher, 1940: 215–7, fig. I_{I-Id}, pl. 9 (figs 2–3). A.M. Clark, 1962: 72.

The species is closely related to *Anteliaster scaber* (Smith) from which it can be distinguished by more numerous abactinal pedicellariae (according to Fisher 1940), or by the size and shape of abactinal spinelets (according to A.M. Clark 1962). The abactinal spinelets have a bushy-headed form in *A. scaber* while they are shorter and truncated in *A. australis*. While the two abactinal features cited above (i.e. pedicellarial density and shape of abactinal spinelets) allowed recognition of the species in the MPE collection, their reliability as specific characters may be questionable (see A.M. Clark 1962, p. 72).

Table 1. Variations in number and shape of spinelets in *Solaster regularis*[1]

Type of spinelets	subspecies *regularis*	subspecies *subarcuatus*	MPE specimens
Number and shape of spinelets on abactinal paxillae	6 to 10 point-tipped spinelets	5 to 6 blunt-tipped spinelets	7 to 20 point- or blunt-tipped spinelets
Number of spinelets on inferomarginal paxillae	10 to 20	10 to 12	10 to 30
Number of spinelets on actinolateral plates	4 to 6	3 to 5	2 to 6
Number of furrow spinelets (adambulacral plates)	4 to 5	3 to 4	3 to 5
Number of subambulacral spinelets (adambulacral plates)	4 to 5	4 to 5	5 to 6
Number of furrow oral spinelets	9	8	7 to 11
Number of suboral spinelets	5	3 to 4	7 to 9

[1]Data from Sladen (1889) and Fisher (1940).

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